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SYSTEM AND METHOD FOR IDENTIFYING TECHNOLOGIES OF INTEREST TO A BUSINESS

Field of the Invention

[0001] The present invention relates to systems and methods for identifying technologies of value to a business.

Background of the Invention

[0002] Businesses are faced with numerous challenges in the marketplace concerning the development and deployment of new technologies. In the first instance, if a business fails to become aware of a new technology, it is at risk for finding itself at a competitive disadvantage with respect to its competitors. This is especially true of businesses that are heavily dependent on the use of new technologies for growth. Also, even where a business is aware of a technology, it must decide whether and how best to acquire it. While a business can develop a technology on its own and certainly many do, very often it is more effective to acquire new technology from elsewhere through relationships with others.

[0003] When a business learns of a technology that is of interest to it, it can seek to acquire that technology through any or all of the following actions:

- It can adopt it on its own, either by buying it in the marketplace from others who have it for sale, or by making it in-house (assuming that there are no legal impediments to its doing so, such as the existence of a patent).

•It can partner with a vendor of that technology.

•It can directly invest in a company that has the technology of interest.

[0004] These approaches involve differing degrees of "intimacy" in the corporate interactions required. For example, the decision to invest capital in another business requires far more due-diligence work and entail far more exposure to corporate risk than merely buying a technology off the shelf from a vendor.

[0005] Given the large sums of money involved in many of these kinds of transactions, the decision making process itself bears further scrutiny. To-date, this decision-making process has generally been a somewhat informal, highly subjective affair, in which managers look at whatever technologies they happen to be aware of and apply a varying set of methodologies to study them. While this approach may work in some cases, it has a number of serious drawbacks. First, the process by which a decision is made is often opaque to outsiders, such as investors, boards of directors, and regulators, and not readily reproducible. Second, the individuals tasked with identifying new technologies of interest may not have the time or inclination or ability to keep fully abreast with the universe of new technologies in which a business might well be interested. There is, therefore, a degree of randomness and unpredictability in the process.

Summary of the Invention

[0006] The present invention provides a systematic approach to the problem of identifying technologies (or, more broadly speaking, other business opportunities) of potential interest to the management of a business or company, by employing both computer-driven and human methodologies in a manner that utilizes the native strengths of each. The approach proceeds along four primary steps:

[0007] 1.IDENTIFICATION: A potential universe of all technologies is identified, and from them a select group of technologies that have attracted particular interest in various relevant media is culled out using an objective tool such as a computer executing a program.

[0008] 2. SELECTION/ELIMINATION: a small group of people (e.g. ten) rank each of these technologies via a scoring tool. While the scores are provided by individuals and thus reflect their individual biases, in the aggregate, subjected to statistical analysis via a computer algorithm, they provide a more objective measure of the merits of the technology (or other business opportunity) under study, as individual biases become subsumed in the group. A high scoring group of technologies thus identified forms a "working pool" for further study.

[0009] 3. EVALUATION: Each of the technologies in the working pool is forwarded to an evaluator, an individual especially familiar with that technology, who considers that

technology in depth from the standpoint of certain additional factors. These are:

A) usability: a compound measure of functionality, portability, and performance/aesthetic features; and

B) appropriability: a compound measure of vendor and product positioning in the marketplace.

[0010] Scores corresponding to each of these two characteristics are calculated from the evaluator's numerical evaluations of the technology as prompted by a series of criteria appropriate for that technology. These criteria are set forth in two tools, a usability tool and an appropriability tool, which calculate the overall scores for each. The resulting final scores are then plotted on a graph such as a matrix, which provides a simple visual summary of the process and a recommendation as to how the business should approach it (i.e., ignore, adopt, partner or invest).

[0011] 4. ACTION: A report (including the matrix plots) of those technologies having suitably high usability/appropriability scores is conveyed to management for action, and the process transitions from one of analysis to decision by management.

Description of the Drawings

[0012] Figure 1 is a block diagram of an embodiment of this invention, and illustrates the overall sequence of steps.

[0013] Figure 2 is a flow chart of the invention, shown for a particular embodiment.

[0014] Figure 3 provides an overview of the process of identifying technologies of

initial interest.

[0015] Figure 4 illustrates the selection elimination process using a selection elimination tool.

[0016] Figure 5 illustrates the testing and evaluation stage, in which the number of technologies is further culled.

[0017] Figure 6 is the decision matrix that results from the process.

Detailed Description

[0018] The invention will be described in terms of an illustrative specific embodiment, shown in the Figures.

[0019] Figures 1 and 2 show the overall sequence of the invention, from identifying a manageable group of technologies for study from among the universe of millions of potential technologies, to the use of an elimination tool to reduce the number further, to testing and evaluation, to the generation of a report.

[0020] The first step (Figure 3) is to identify a universe of emerging technologies of theoretical interest. There are many possible definitions of what constitutes a technology of at least theoretical "interest" to a business, and this will depend somewhat on the needs and interests of the business in question. From this universe a set of approximately 50 - 100 technologies is culled. (The numbers recited in this example likely will vary in practice with the resources at hand.) In this example, the immediate focus is on technologies that have attracted a certain level of interest in some pertinent part of the

press or public's eye. A list of such possibilities can be generated by first identifying a pertinent set or resources to examine. These include:

- company research and development documents;
- academic research;
- technology oriented journals;
- trade shows;
- press releases;
- information gleaned from vendors; and
- personal contacts within and external to the business.

[0021] The next step in the process is to search these sources for technologies that appear to have attracted a suitable degree of interest or "hype." There are a number of ways of doing this, including performing a manual scan of the literature, but in this embodiment it is preferred that computers be used to accomplish this electronically, for example by counting the number of times a technology is mentioned in the relevant journals or cited in publications, including on web pages. (There are commercially available tools to accomplish this, including any that scour web pages accessible on the internet to count the number of times that a technology is mentioned, which is a reasonable first-order measure of interest or "hype" associated with that technology. One tool suitable for this purpose has been developed by Themescape, Incorporated.) One consideration is that the technology be new. Other considerations are that the technology have specific features that are not yet widely in use, that it be in the hands of a small

number of individuals or organizations, and that the technology be experiencing its first burst of publicity. (This can be determined by examining the dates of the citing articles, and paying particular heed to those technologies for which many recent citations have been found in combination with a paucity of citations for that technology prior to a predetermined date.) By whichever tool is employed for this process of identification, some manageable subset, such as the fifty to one hundred of the most promising technologies that are currently the subject of great interest in industry are identified. This set of technologies defines the "initial selection" and is marked for further study.

[0022] After this first set of 50 - 100 technologies has been identified, each undergoes evaluation by a team of human evaluators who manually rate each of these technologies. In this embodiment, a group of ten human evaluators is used. These evaluators are provided with a scored elimination tool, which is used to further reduce the number of technologies under consideration to approximately 25. The elimination tool is built around a questionnaire that presents a set of weighted criteria (e.g., ten) against which each of the technologies is scored by each of the evaluators on a scale that varies from 1 (low) to 5 (high). The weights given to each question can be varied, as can the number and type of questions, depending on the needs of the end user. One example of one possible set of criteria is shown in table one and is further explained in table two below:

Weight	Table 1: Criteria Used in Elimination Tool
5%	The solution offered is, for the most part, unique
20%	This technology has low barriers with regard to standardization, cooperation and participation of competitors etc.
5%	This technology closely follows the current tech analysts vision of the future
5%	I believe this technology will provide many advantages over the existing technology
5%	The articles I have read, and demos I have seen lead me to believe that this technology has a lot of potential
15%	This technology appears to sacrifice no functionalities that are important in my opinion to gain its advantage over existing technolog
5%	I can immediately think of many consumer/ business applications for this technology
5%	I am very curious to see the technology perform and I believe the curiosity it generates will drive the product on the market
5%	I know of nothing being developed that will be a better substitute for this technology
30%	I believe the concept behind this technology is very compelling
100%	Total Score

	Table 2 :Description of Elimination Criteria
1	**The solution offered is, for the most part, unique**
	There are no other technologies that offer the same solution
	Technologies can be adapted to fit the solution, however this technology is designed as a unique solution
	There exists many technologies that offer similar solutions
2	**This technology has low barriers with regard to standardization, cooperation and participation of competitors etc.**
	Standards are already in place to facilitate wide adoption
	Standards needed are on the horizon
	This technology requires a set of new standards
3	**This technology closely follows the current tech analysts vision of the future**
	The technology is an important part of many roadmaps
	There is ambivalence surrounding the vision of this technology

	Technology analysts and current visions do not include this technology
4	**I believe this technology will provide many advantages over the existing technology**
	The new technology will provide a more efficient solution than any existing technologies
	There are advantages and disadvantages to using the new technology
	The existing technology provides a more efficient solution
5	**The articles I have read, and demos I have seen lead me to believe that this technology has a lot of potential**
	From the information I have gathered, I believe in the technology's future
	From the information I have gathered, I am undecided as to my belief in the technology's future
	From the information I have gathered, I do not believe in the technology's future
6	**This technology appears to sacrifice no functionalities that are important in my opinion to gain its advantage over existing technology**
	The new technology offers more functionality and features than existing technology
	There is no significant difference in the features and functionality between new and existing technologies
	Existing technology has more functionality, features
7	**I can immediately think of many consumer/ business applications for this technology**
	I can envision many diverse market applications for this technology
	There is a limited number of markets for this product
	I do not see any potential markets for this technology
8	**I am very curious to see the technology perform and I believe the curiosity it generates will drive the product on the market**
	The product has novel functionalities, and/ or features that will be valued by the market
	The product has novel features, however they will not be valued by the market

	The product has no novel functionalities, and/ or features that would be valued by the market
9	**I know of nothing being developed that will be a better substitute for this technology**
	When the technology enters the market it will be superior to substitutes entering the market in the same time frame
	Nothing distinguishes this product from other substitutes that will be entering the market
	There are already products on the market that are better substitutes for this technology
10	**I believe the concept behind this technology is very compelling**
	This concept will be a "killer app"/ It is a revolutionary concept with high potential to penetrate the market (ie. Internet, E-mail, GUI)
	This is a good concept, however it will be easily substituted by new technologies in the near future
	This concept has no potential to make an impact on the market/ It is very similar to existing technology

[0023] The criteria may be presented to an evaluator online, or they may be provided on paper in a form such as is presented below in Table 3:

				CRITERIA								
		5%	20 %	5%	5%	5%	15 %	5%	5%	5%	30 %	100%
		1	2	3	4	5	6	7	8	9	10	Total Score
	1											0.00
	2											0.00
	3											0.00

	4											0.00
	5											0.00
T	6											0.00
E	7											0.00
C	8											0.00
H	9											0.00
N	10											0.00
O	11											0.00
L	12											0.00
O	13											0.00
G	14											0.00
Y	15											0.00
	16											0.00
	17											0.00
	18											0.00
	19											0.00
	20											0.00
	21											0.00
	22											0.00
	23											0.00
	24											0.00
	25											0.00

[0024] These scores provided by each evaluator are then summarized on a spread sheet. For example, the following spread sheet format shows what a filled in form from an individual evaluator after his review of the fifty technologies set forth in the initial selection:

TABLE 4

				QUESTIONS								
		5%	20 %	5%	5%	5%	15 %	5%	5%	5%	30 %	100%
		1	2	3	4	5	6	7	8	9	10	Total Score
	1	4	3	5	5	5	4	5	5	4	5	4.35
	2	3	3	4	3	4	3	4	5	3	4	3.55
	3	4	3	5	5	4	3	5	5	4	5	4.15
	4	3	5	4	2	2	3	3	2	2	3	3.25
	5	5	4	4	5	5	5	5	5	5	5	4.75
T	6	4	3	4	5	4	5	5	4	3	3	3.70
E	7	5	5	4	4	5	4	3	5	4	5	4.60

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C	8	4	4	4	5	5	5	5	5	3	4	4.30
H	9	4	5	4	2	2	4	3	4	2	3	3.55
N	10	4	4	4	3	4	4	5	5	4	4	4.05
O	11	5	5	5	5	5	4	4	5	4	5	4.75
L	12	4	3	3	3	3	4	3	4	4	3	3.30
O	13	4	5	4	4	4	3	5	4	3	4	4.05
G	14	5	5	4	5	5	3	5	5	4	5	4.60
Y	15	5	5	5	5	4	5	5	5	5	5	4.95
	16	4	4	3	2	2	3	3	4	3	3	3.20
	17	4	4	4	4	4	3	4	5	4	5	4.20
	18	4	4	4	5	4	3	3	4	3	4	3.80
	19	4	4	4	4	3	4	4	5	4	4	4.00
	20	3	4	5	4	4	3	4	4	3	4	3.80
	21	4	3	3	4	4	3	4	5	4	4	3.65
	22	4	3	4	4	4	4	5	5	4	5	4.20
	23	5	4	2	2	2	4	3	4	3	3	3.35
	24	3	3	4	5	4	3	4	5	4	5	4.00
	25	3	4	4	4	4	3	4	4	4	4	3.80
	26	2	4	3	3	3	2	3	3	2	3	2.95
	27	3	4	5	4	4	3	4	5	4	4	3.90
	28	4	4	4	5	5	5	5	5	5	5	4.70
	29	4	4	4	3	3	4	4	4	3	4	3.85

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	30	4	4	4	3	4	2	4	3	3	4	3.55
	31	5	4	4	4	4	2	4	5	4	5	4.10
	32	3	3	3	4	4	4	5	5	4	4	3.80
	33	4	4	5	4	4	3	4	5	3	4	3.90
	34	4	4	5	5	5	4	4	5	4	5	4.50
	35	3	4	4	3	4	4	4	5	3	4	3.90
	36	2	3	3	3	3	3	4	3	3	3	3.00
	37	3	3	3	3	3	3	3	3	3	3	3.00
	38	3	3	3	3	3	3	3	3	3	3	3.00
	39	3	4	4	4	4	3	4	5	4	4	3.85
	40	4	4	4	3	3	4	5	5	4	4	4.00
	41	3	4	5	4	4	4	4	4	3	4	3.95
	42	4	4	4	4	4	4	4	5	4	5	4.35
	43	3	4	4	5	4	3	3	4	4	4	3.80
	44	4	4	5	4	4	3	4	4	4	4	3.90
	45	3	4	4	4	4	3	4	4	4	4	3.80
	46	4	4	5	5	5	5	5	5	3	4	4.35
	47	4	4	4	4	4	2	4	5	4	4	3.75
	48	5	4	3	3	3	3	3	5	3	4	3.70
	49	4	2	3	2	2	2	4	3	2	3	2.60
	50	5	4	2	4	3	3	4	5	5	4	3.85

[0025] The next step in the process is the statistical analysis of the evaluation data provided by the evaluators. A standard statistical package can be used with a spread sheet program to consider the evaluations of all of the evaluators for each of the technologies evaluated, and readily provide such fundamental measures of each criteria as mean score, standard deviation, minimum and maximum score or any other statistical measure that may be of interest. In this example, an overall score of less than 3.5 indicates that the technology is not of interest; a score greater than 3.5 indicates that the technology should be subjected to further scrutiny. Table 5 presents one form that a table summarizing this data (here analyzing the overall scores of 50 technologies as developed by a team of ten evaluators) can take:

TABLE 5 - STATISTICAL ANALYSIS

#	Mean	St. Dev.	Min	Max
1	4.35	(based	4.35	4.35
2	3.55	On	3.55	3.55
3	4.15	Data	4.15	4.15
4	3.25	For	3.25	3.25
5	4.75	Each)	4.75	4.75
6	3.70		3.7	3.7

7	4.60		4.6	4.6
8	4.30		4.3	4.3
9	3.55		3.55	3.55
10	4.05		4.05	4.05
11	4.75		4.75	4.75
12	3.30		3.3	3.3
13	4.05		4.05	4.05
14	4.60		4.6	4.6
15	4.95		4.95	4.95
16	3.20		3.2	3.2
17	4.20		4.2	4.2
18	3.80		3.8	3.8
19	4.00		4	4

20	3.80		3.8	3.8
21	3.65		3.65	3.65
22	4.20		4.2	4.2
23	3.35		3.35	3.35
24	4.00		4	4
25	3.80		3.8	3.8
26	2.95		2.95	2.95
27	3.90		3.9	3.9
28	4.70		4.7	4.7
29	3.85		3.85	3.85
30	3.55		3.55	3.55
31	4.10		4.1	4.1

32	3.80		3.8	3.8
33	3.90		3.9	3.9
34	4.50		4.5	4.5
35	3.90		3.9	3.9
36	3.00		3	3
37	3.00		3	3
38	3.00		3	3
39	3.85		3.85	3.85
40	4.00		4	4
41	3.95		3.95	3.95
42	4.35		4.35	4.35
43	3.80		3.8	3.8

44	3.90		3.9	3.9
45	3.80		3.8	3.8
46	4.35		4.35	4.35
47	3.75		3.75	3.75
48	3.70		3.7	3.7
49	2.60		2.6	2.6
50	3.85		3.85	3.85

[0026] These scores are then ranked from high to low, and the highest scoring technologies (in this example, the top 25) are selected to form a working pool for comprehensive testing and evaluation (Figure 5).

[0027] At the testing and evaluation stage, each of the technologies of the working pool is assigned to a single evaluator for further study. Physical "hands-on" tests are made of that technology to determine measures of both its "usability" and

"appropriability". "Usability" is defined here to be a compound measure of product performance characteristics, user friendliness, aesthetic qualifies and readiness for market. "Appropriability" is defined in terms of vendor and product positioning in the marketplace and the like, and also reflects the desire of the target company to gain equity funding. In each case, the Evaluator is provided with a form or questionnaire that presents a set of weighted criteria against which each of the technologies is scored by the Evaluator, again on a scale that varies from 1 (low) to 5 (high). The weights given to each question can be varied, as can the number and type of questions, depending on the needs of the end user. The set of criteria used to judge usability is known here as the usability tool, and the set of criteria used to judge appropriability is referred to here as the appropriability tool. A high usability score indicates that a technology is ready for commercial deployment; a high appropriability score indicates favorable vendor and product positioning with respect to the technology.

[0028] One example of possible sets of criteria for the usability and appropriability tools is set forth in tables 6 and 7 below:

TABLE 6- USABILITY CRITERIA

FUNCTIONALITY	WEIGHT	RANK (1-5)	MAX SCO
User Friendliness			
The controls are accessible	3	5	0.00
The technology completely satisfies the primary task	3	5	0.00
It completely resolves the task	2	5	0.00

The set of instructions is very simple to use	1	5	0.00
The instructions provided are accurate	3	5	0.00
	12	25	0.00
Efficiency			
The machine/software starts up fast	1	5	0.00
The machine/software responds fast to the task	3	5	0.00
The different modules/parts communicate easily	3	5	0.00
The product gives an accurate response	2	5	0.00
	9	20	0.00
APPLICABILITY			
The product is suitable for the target applications	3	5	0.00
The technology provides a unique solution	2	5	0.00
The technology has potential to increase productivity	3	5	0.00
The technology has potential to reduce cost	3	5	0.00
The technology entails a low cost of implementation	2	5	0.00
	13	25	0.00
PORTABILITY			
The product is not bulky	3	5	0.00
The technology is adaptable to different network environments	3	5	0.00
The technology consumes low amounts of power	2	5	0.00
The technology is portable across several platforms	2	5	0.00

	10	20	0.00
AESTHETIC FEATURES			
The product looks appealing	3	5	0.00
It is physically comfortable to work with	3	5	0.00
The controls are well located	2	5	0.00
The key parts are arranged conveniently	2	5	0.00
The controls are sized appropriately	1	5	0.00
The product's color scheme is appropriate for the targeted market(s)	1	5	0.00
	12	30	0.00
		Total Score	

TABLE 6: APPROPRIABILITY

FUTURE POTENTIAL	IMPORTANCE	RANK (1-5)	MAX SCORE
The product imitates existing technologies	2	5	0.0
The product substitutes existing technologies	1	5	0.0
The product is ready for the market	2	5	0 0
The product offers potential for the technology to evolve to other uses	2	5	0.0
There are no other products in the pipeline that would threaten this technology	1	5	0.0
The product will attract a large initial market	3	5	0.0
The market for this product will grow with time	3	5	0 0

	14	35	0.0
VENDOR			
The vendor cannot achieve scale	3	5	
The technology has extensive proprietary differentiation	2	5	
The technology entails a low switching cost	1	5	
The vendor's brand is not easily recognizable	2	5	
The company does not have the resources to fund development and marketing of the technology	3	5	
The vendor does not have established distribution networks	3	5	
The company cannot contain retaliatory action from established players	2	5	
	16	35	
COMPETITION			
The competition is diverse	2	5	
The competitors' brands are as recognizable as the vendor's	2	5	
The competition cannot easily imitate the vendor's ideas	3	5	
The competition has a high level of specialized assets, distribution networks and a large customer base	3	5	
Switching from a competitor's product entails a low switching cost	1	5	
Competitors do not have the resources to retaliate or imitate	2	5	
	13	30	
CUSTOMERS			
The customer does not have a range of substitutes available in the market	3	5	
Customers have a high propensity to substitute products	3	5	
Buyers have limited bargaining power	2	5	

The technology attractive to decision makers	1	5
Buyers are not very sensitive to price	3	5
Customers recognize the vendor's brand easily	3	5
Buyers are interested and capable of backward integration (acquire the vendor)	1	5
The technology significantly impacts quality and performance of the buyer	2	5
	18	40
SUPPLIERS		
Suppliers have limited bargaining power	2	5
There are substitute inputs	1	5
The inputs do not have a significant impact on cost and product differentiation	3	5
Suppliers are interested and capable of forward integration (acquire the vendor)	3	5
	131	

[0029] Preferably, a computer is then used to tally up the weighted usability and appropriability scores of each technology studied, normalized to a percentile score, with 100 being the maximum possible score. (Each of these tools can be implemented in a variety of ways, including on a spreadsheet or other commercially available software package having the ability to analyze data by providing weighted sums and basic statistical measures.) These numbers are then used as the coordinates to plot the position of the technology on a Decision Matrix (Figure 6) having axial dimensions of usability

and appropriability. The matrix is marked off into a three by three rectangular form of nine labeled spaces, as shown in Figure 6. Depending upon which part of the matrix a technology falls, a recommendation is made to managers on whether to ignore the technology, adopt it, partner with a vendor or invest in the company to acquire an equity position in it. Generally speaking, the corner that is closest to the origin identifies the least valuable technologies (i.e., low usability and low appropriability). The upper right hand corner indicates the most valuable technologies, which are recommended for adoption, partnering or investment. The other areas of the matrix identify less favorable assessments where nevertheless the technology has some merit worth pursuing. Alternatively, another medium for presenting this data in readily discernable visual form can be employed, such as other kinds of charts, graphs, tabulations, etc.

[0030] This approach thus provides management with a tool for evaluating technologies that takes advantage of the strengths of both human judgement in evaluating a technology and the computational power of machines to provide a graphical overview of the merits of acquiring a technology. It is to be understood that the specific criteria presented here can be supplemented by other criteria. For example, one of the areas that an evaluator may be chosen to review is the degree to which the technology in question is covered by a patent, which can influence the decision whether to adopt, partner, or invest for that technology. Also, the criteria can be modified to reflect the specific needs of a business.